A newsletter of the Local Technical Assistance Program (LTAP)

Issue Number 43, Summer 1994

Bulletin

Ten Reasons Why Asphalt Pavement Recycling Makes Sense!

By George D. Crommes, P.E.

At this time of maximizing our resources with quality in the forefront, the potential of recycling is greater than ever. Of particular note is the many advantages of recycling our asphalt pavements, many of which requires extensive maintenance because of increased traffic loads on roads that were never designed for them in the first place. Weak bases and subbases must be corrected in order that our roads "foundations" can do their job of properly supporting the street and highway surfaces which carry your commerce and people.

Consider recycling because of the following reasons:

1. Recycling is cost-effective, especially when life-cycle costs are considered.
2. A valuable resource is in our existing asphalt pavement — asphalt and aggregates.
3. Recycling can eliminate the need for extensive maintenance required on older pavements.
4. Funding for maintenance is limited and needs are increasing.
5. Many types of pavement deficiencies can be corrected with recycling.
6. Energy is saved with recycling, especially with cold-in-place recycling.
7. Existing geometrics can be preserved including existing curbs, gutters, and manholes.
8. In most instances, utilities can remain in place.
9. Strengthening of the pavement structure can be done with recycling thereby providing an adequate "base" for the road network infrastructure.
10. An agency's efforts in recycling vividly shows the tax payers the agency's concern with saving materials and money. •

Contents

Test Your Metric Knowledge

1 Choose the answer that best completes this statement. "Hard metric" refers to:

A. The mathematical conversion of inch/pound values to metric values.

B. The process of using components or dimensions that were originally selected or designed in metric units.

C. The original metric system, before simplification.

2 In 1991, President Bush signed an executive order concerning the metric system. What did this order do?

A. Set a timetable by which all industry must convert to the metric system.

B. Directed the government to move rapidly to metric usage.

C. Provided for tax incentives to businesses that convert to metric.

D. Set up a fund to be used for research in U.S. metric usage.

3 The metric system contains how many base units?

A. Twelve

B. Twenty-two

C. Seven

D. Ten

4 There are three categories of units within the metric system: base units, supplementary units, and ? units.

A. Derived

B. International

C. Sub

D. Scientific

5 In the metric system, what does the prefix "milli" mean?

A. One million

B. One millionth

C. One thousand

D. One thousandth

6 A derived unit can be described as:

A. A metric unit that is formed by mathematically combining base units and other derived units.

B. A metric unit that has been borrowed from a different system of measurement.

C. A unit in the "old" metric system that is no longer used.

D. A user-created unit that combines several base units into one and is defined by the creator on an engineering drawing.

7 The newton is used to measure:

A. Force

B. Pressure and stress

C. Energy or quantity of heat

D. Inductance

8 Which of the following units would be used to measure stress in bolts?

A. Meganewton

B. Kilopascal

C. Kilogram

D. Cubic centimeter

9 In metric, stress is indicated in:

A. Kilograms per square meter

B. Kilonewtons

C. Pascals per square centimeter

D. Pascals

10 In general workplace usage, what is the most commonly used metric unit to express temperature?

A. Degree Centigrade

B. Degree Fahrenheit

C. Degree Celsius

D. Kelvin

11 Which unit in the inch/pound system is replaced by the pascal in metric?

A. Pounds per square inch

B. Pound force

C. Cubic inch

D. Pounds per cubic inch

12 Which SI metric unit is always used for dimensioning or engineering drawings?

A. Meter

B. Decimeter

C. Centimeter

D. Millimeter

Answers: 1.B, 2.B, 3.C, 4.A, 5.D, 6.A, 7.A, 8.B, 9.D, 10.C, 11.A, 12.C,

(Source: Technology Transfer Newsletter, Summer 1993, University of Connecticut Transportation Institute.)

Ergonomics for a Better Fit

Fortunately, the days are gone when Bob Cratchit had to beg Scrooge for a bit of coal to warm the office. But many offices are still noisy, improperly lighted and furnished, and badly laid out. The consequences can be stress, lower productivity, and possibly physical pain, says Hall Smith ergonomics specialist for the UW-Madison Classified Personnel Office. Ergonomics, also called human engineering, seeks to create a better fit between people and their work environments.

Noise Adds Stress

Noise, for example, is one of the top stress producers in the work environment. While office equipment is generally quieter than a decade ago, many more people now have work stations instead of offices. "Noise is distracting and can reduce productivity. When there are deadlines or pressure to produce under such conditions, the result is stress," says Smith.

Solutions to noise problems include a variety of sound deadening materials: wall coverings, carpeting, ceiling baffles or noise control ceiling tiles, and mats on hard surfaces.

New office designs may also help. Future offices are likely to be "hotel style," Smith says. They will have specialized spaces, like a "telephone booth" where the user moves in for a while, makes a number of calls, then moves out again. The telephone is freed from other distractions, and others are freed of the added noise of a coworker's telephone conversations.

Let There Be Less Light

Most office lighting is designed for the paper era and is too bright for comfortable computer use. Many people do not recognize these differences and will place their monitors next to a window. The eyes react in the same way as when you walk into a darkened theater from a bright light," says Smith. "They have to constantly adjust, and the older you are, the longer it takes them to adjust."

Users should move terminals to lower light locations and get a small task light if they also have to look at hard copy. You can also put dimmer switches on overhead lights, install adjustable window coverings, or put hoods around monitors to block light from the sides.

Equipment Failings

It can be hard to give up apparently good chairs and desks just because they date from the typewriter era. Smith frequently sees people who have put their computer keyboards on old typing stands. It is best to have the wrist horizontal with the keyboard. Typing stands are the wrong height and using them for computer keyboards can lead to wrist discomfort.

"Chairs should be as easy to adjust as a car seat," says Smith. "Many of the ones I see are so old they won't move or they have no adjustments at all." Workers should move their chairs several times a day to make themselves comfortable as they work.

Some simple gadgets can ease a worker's tasks. A mouse pad with a wrist support puts your hand into a more natural position over the mouse and helps protect it from overuse discomfort. Some are available at discount stores for under $20. An adjustable document holder can put hard copy 13 inches from the worker's eyes, the correct distance for best vision. (By comparison, a computer monitor normally is 20 to 23 inches away.)

Awareness, Pacing, and Micro-Breaks

Because humans are so adaptable, they often do not recognize ergonomic problems. If the monitor is too low they hunch over to see it. They well squint against bright light to see the screen, ignore uncomfortable chairs, or make hundreds of extra trips or reaches to accommodate to their office environment.

Even when they are experiencing pain that might have ergonomic causes, they may not recognize it, or may prefer to ignore it. "Some people don't want to call attention to themselves," says Smith. Others may fear they'll be accused of trying to avoid doing the work."

A first step is to notice discomforts. The worker can think about how he or she feels at different times during the day, or after completing different tasks. Keeping a log or diary of discomforts can help identify office environment problems that can be fixed.

Another step is to manage the work effort. "No one should stay in a static position doing the same task for more than 35 to 40 minutes," says Smith. While they may not need a complete break, workers should move around in their chairs, stretch, and gently massage their necks and wrists to improve blood circulation.

When there is a task that requires more than the normal effort, its important to change the pacing of the work. Just because you can type one page in two minutes, do not assume that means you can type 10 pages in 20 minutes. Plan to incorporate rest breaks to allow your body to accommodate to the extra effort.

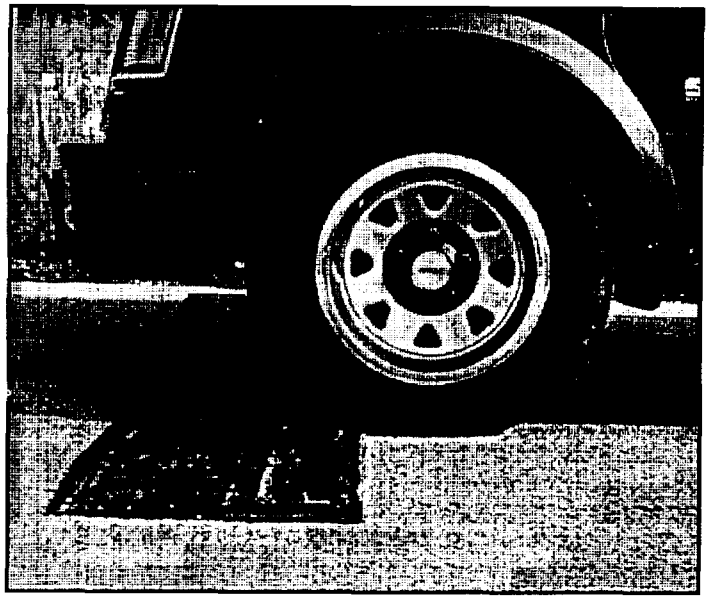
Continued on page 7

Portable Rumble Strips for Work Zones — A SHRP Product

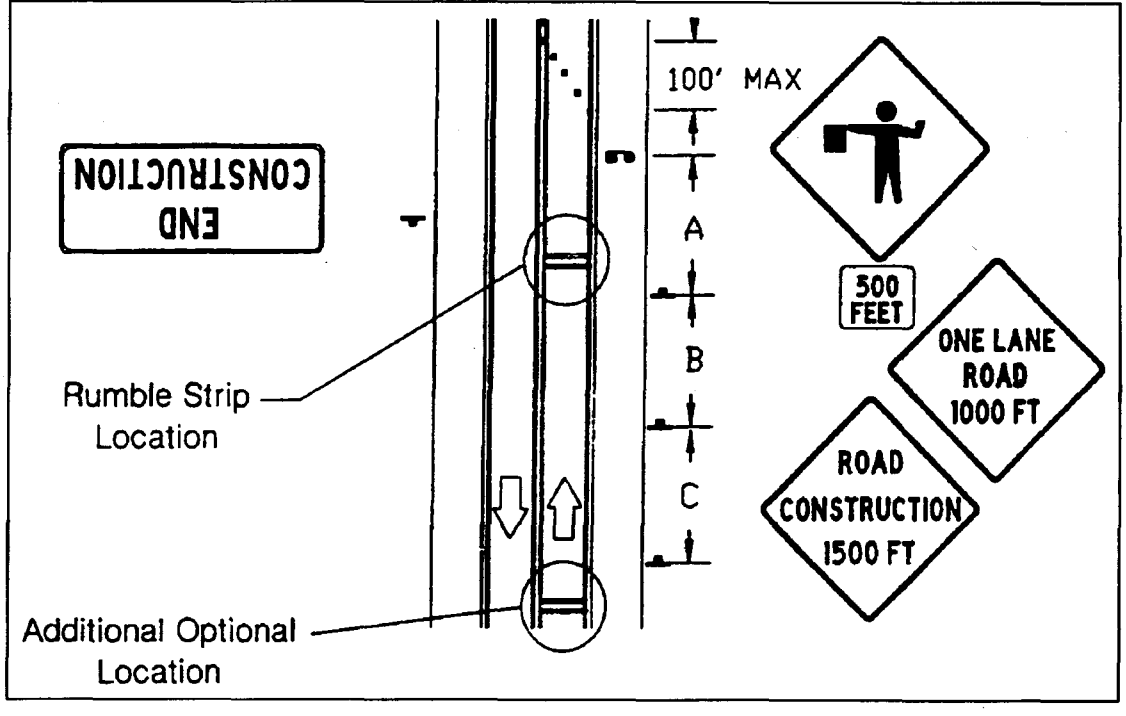
Want to really wake up approaching drivers? The Portable Rumble Strip, a new lightweight device, will do the trick. Workers can put it on the road at one or more locations ahead of the work zone, ideally just ahead of warning signs and the flagger. It causes a jolt and an audible rumble, alerting drivers to danger. The device is especially valuable in rural, flagger-controlled work zones where moderate-to-high-speed traffic is being channelled from two lanes to one.

Made of durable neoprene rubber or flexible polyethylene plastic, the Portable Rumble Strip measures 10 feet long and 18 inches wide, and weighs just 75 pounds. One or two workers can easily unfold and deploy it from the back of a pickup, along with workzone warning signs.

Tests have shown consistently that this simple, effective device noticeably reduces motorists' speed and increases motorists' recognition of work zone signing. The device can be purchased for about $100. *SHRP Product #3015* •



Placement of Rumble Strip



Stabilizing Soils With Nails

Soil nailing is a technique used to reinforce and strengthen existing ground. The fundamental concept is that soil can be reinforced by installing closely spaced grouted steel bars, called nails, into a slope or excavation as construction proceeds from the top down. The nails are installed nearly horizontal and improve the shearing resistance of the soil.The nails are not pretensioned (as are tiebacks) when they are installed. The grouted soil nails are forced into tension as the ground deforms laterally in response to the loss of support caused by continued excavation. This reinforces the soil creating a zone of stabilized earth that aids in supporting the unreinforced earth behind. After the soil nail wall is constructed, a facing is applied.

Following is the sequence for constructing a typical soil nail wall.

1 **Excavate Small Cut.** For soil nail walls to be most effective, they should be constructed in ground that is able to stand unsupported on a vertical or steeply sloped cut of 1 to 1.8 m (3 to 6 ft) for at least one or two days, and can maintain an open drill hole for at least several hours.

2 **Drill Holes for Nails.** Nail holes are drilled to a particular length and inclination. Typical nail lengths are 70 to 100 percent of wall height. Typical nail spacing is 1.2 m to 1.8 m (4 to 6 ft) vertical and horizontal. Typical inclination for grouted nails is 15 degrees below the horizontal.

3 **Install and Grout Nails.** The nails are inserted and the drill hole is grouted in order to bond the nail to the surrounding soil. Plastic "centralizers" are used to center the nail in the drill hole. For permanent walls, the nails are epoxy coated or fully encapsulated for corrosion protection.

4 **Place Prefab Drain Mat.** A prefabricated drain mat of 30 cm (12 in) width is centered between the vertical nail columns, and is installed in contact with the soil before shotcreting to provide drainage behind the shotcrete face.

5 **Place Initial Shotcrete Layer and Install Bearing Plate.** Place wire mesh and cover the exposed soil face with a layer of shotcrete (pneumatically applied concrete). The nails are then prestressed to a small percentage of their design load by hand tightening a nut onto the threads of the nail against a steel bearing plate placed against the face of the initial shotcrete layer.

6 **Repeat Process to Final Grade.** The process is repeated for all succeeding levels until final grade is reached.

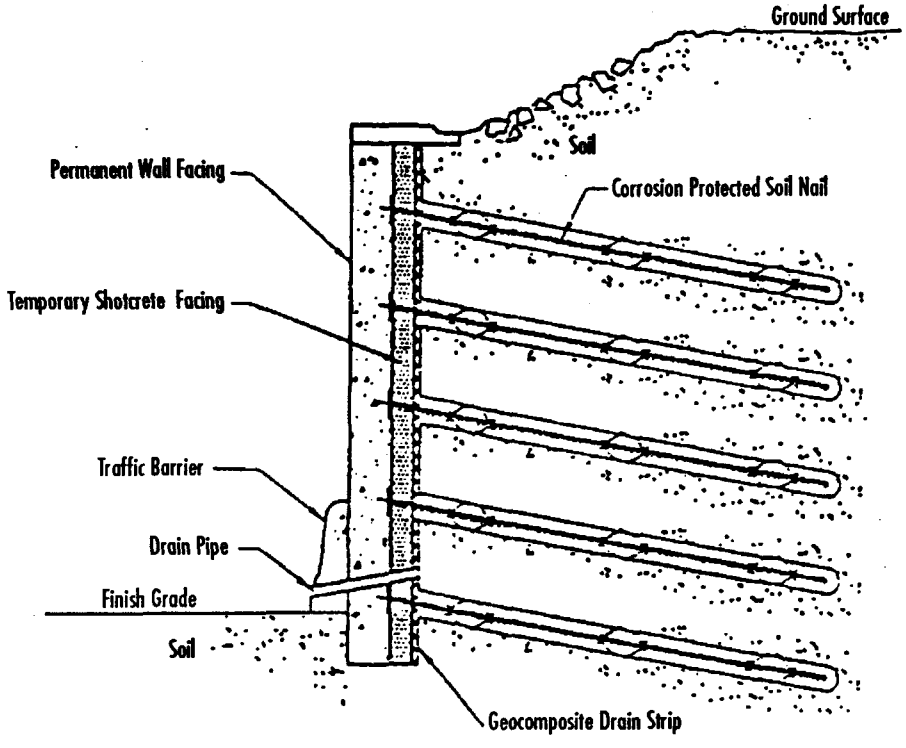
7 **Place Final Facing.** For permanent walls, usually the final shotcrete layer, or a cast-in-place concrete facing, are used to serve as the permanent wall facing depending upon architectural requirements.

Some advantages of soil nailing are:

- Reduce cut excavation and backfill.
- Reduce concrete use
- Elimination of deep foundations for support.
- Potential reduction of right of way.
- Money savings over conventional earth support systems.

The most cost-effective application of soil nailed walls is as an alternative to a tieback soldier pile wall or a conventional wall with temporary shoring, where site geometry or adjacent property constraints do not permit unsupported cut excavation. •

(Source: Adapted from "Tech Notes" by WSDOT's Materials Lab, April 1994.)



Solution Found for Sharp Shoulder Drop-offs

(T^2 Editor's Note: Shoulder drop-offs during construction or reconstruction is the subject of the following news release from AAA. Obviously, the best solution to this problem is to pave the shoulders at the same time as the pavement, as is typically done in Washington.)

Late one summer, a car's passenger-side wheels dropped off the edge of a newly resurfaced, two-lane highway. The road's shoulder had not yet been resurfaced and was 4 to 10 inches lower than the roadway. The driver, struggling to return to the road, steered hard to the left. The car jumped back onto the road, it's rear wheel catching the steep edge of the road, swinging it even further to the left. The maneuver brought the car into the next lane, where it collided with an oncoming car. The government agency involved was successfully sued for $277,555.32 for failing to keep its highway shoulder reasonably safe for motorists.

The potentially deadly pavement edge drop-off on roads under construction leads to hundreds of serious, and preventable, accidents each year. Yet a simple, low-cost solution is available, according to a report just released by the AAA Foundation for Traffic Safety.

Engineers Jack B. Humphreys, P.E., and J. Alan Parham, P.E., at the University of Tennessee Transportation Center surveyed state transportation officials and road contractors to find out how they handle this deadly hazard. The researchers concluded that contractors can add an inexpensive angled "fillet," which at a 45-degree angle provides enough continuity between shoulder and roadway for drivers to maintain full control of their vehicles.

Road contractors can lay down a 45-degree angle fillet that allows car tires to climb the edge safely, without oversteering. All that is required is a special edging device attached to their resurfacing equipment and less than 1 percent additional paving material. This temporary shoulder edging could become part of all road resurfacing contracts' scopes of work.

Severe pavement edge drop-offs are uncommon except while driving through roads under construction. Most agencies' road resurfacing contracts specifically exclude shoulder work, because they use their own personnel to do this work, usually the people responsible for snow removal during the winter months. Contractors performing the resurfacing can put up low shoulder signs for motorists or lay down an interim shoulder at their own expense. A few road contractors already use the angled fillet in order to reduce the likelihood of accidents.

Humphreys and Parham recommend that all agencies either award roadway resurfacing contracts where one contractor performs both roadway and shoulder repair or build the 45-degree angle fillet into the road contract specifications. Then, if weeks or months pass between road resurfacing and the shoulder work, motorists will not need to face dangerous drop-offs.

Single copies of the report, *The Elimination or Mitigation of Hazards Associated With Pavement Edge Drop-Offs During Roadway Resurfacing*, are available free from the AAA Foundation for Traffic Safety, 1440 New York Avenue, NW, Suite 201, Washington, D.C. 20005. Telephone: (202) 638-5944; Fax (202) 638-5943.

The AAA Foundation for Traffic Safety is a not-for-profit, publicly-supported charitable research and educational organization dedicated to saving lives and reducing injuries by preventing traffic accidents. •

(Source: News release of the AAA Foundation for Traffic Safety.)

Caution: Shoulder drop-off with 4-inch, 90-degree angle drop.

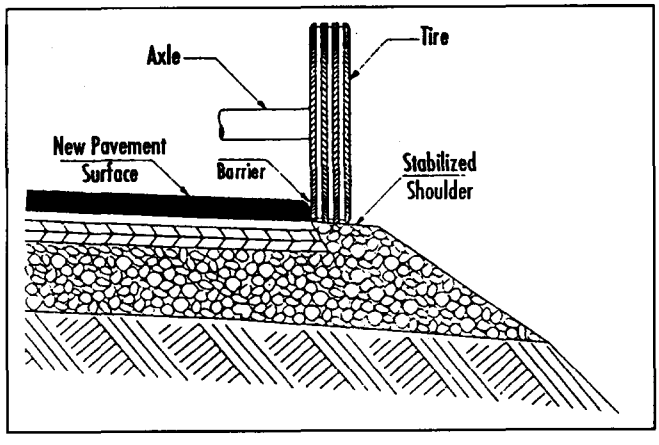


Figure 5: Tire Against Barrier of Pavement Edge Drop-Off

Safer Alternative: Shoulder drop-off with 45-degree angle fillet.

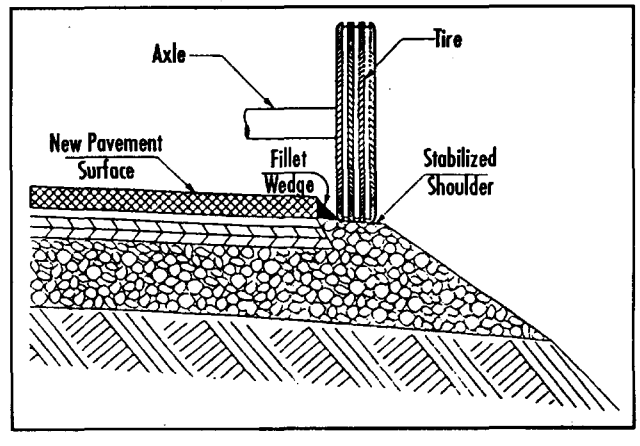


Figure 6: Tire Against Pavement Fillet Wedge

Design Standards Issued

The Architectural and Transportation Barriers Compliance Board has issued an interim final rule, effective December 20, 1994, which establishes accessibility standards for new construction and alterations of state and local government facilities covered by Title II of the American with Disabilities Act (ADA) of 1990. In addition, editorial changes have been made to clarify certain ADA Accessibility Guidelines. Comments will be accepted on the interim final rule until December 20, 1994. For further information, contact Elizabeth A. Stewart, Office of the General Counsel, Architectural and Transportation Barriers Compliance Board, 1331 F Street NW, Suite 1000, Washington, D.C. 20004; telephone (202) 272-5434, extension 52 (June 20, 1994, *Federal Register*, page 31676). •

Top 10 Reasons Why I Wear My Safety Belt

1. I just don't like the taste of glass.
2. I can think of better things to do with $47.
3. I don't have a license to fly.
4. Steering wheels give me headaches.
5. Plastic surgery isn't for me.
6. I can see the road just fine from inside the car.
7. The family reunion just wouldn't be the same without me.
8. Emergency rooms are not my idea of the late night place to be.
9. My head won't fit in the glove compartment because it's already full.
10. I know my brother's (sister's) driving out there somewhere.

(Source: Adapted from "The Ohio Traffic Record," as appeared in "Mileposts," Summer 1992, State Safety Coordinating Committee, Montgomery, Alabama.)

Continued from page 3

"Unfortunately what happens is that people get rushed and they are not concentrating on how they do the work," says Smith. "Instead, they are paying attention to how much more work there is to do."

Rearranging the Office

Arrange the office for easy, efficient movements. Consider where you store things from a body mechanics perspective. Put what you use most closest to your body so you are not constantly reaching. Store less frequently used items farther away. Put heavier objects down lower — below the waist where they are easier to lift. Store lighter things higher up.

Do not use the under desk area for storage. It cramps your legs and prevents you from being able to stretch and change position.

On the other hand, it is better to put the coffee pot down the hall. That way, you are forced to get up and take a walk every now and then.

Be Cautious

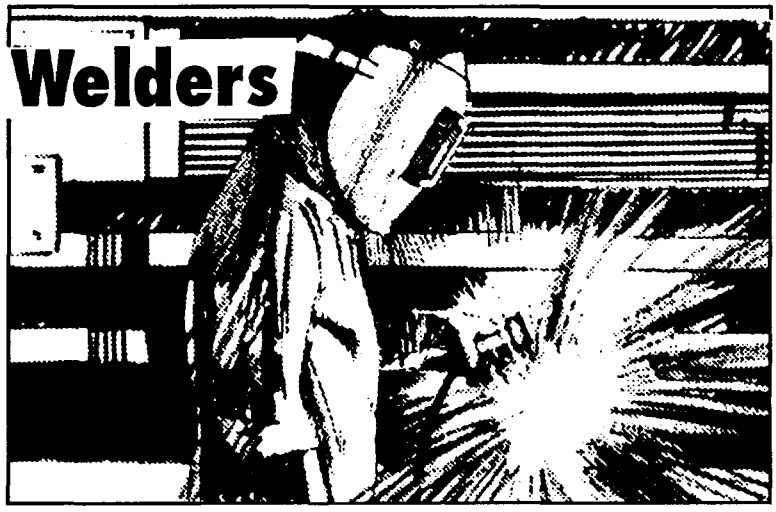
Before you plunge into an ergonomic office overhaul, though, a word of caution. You can make some changes to improve your situation, but do not think ergonomics is either simple or obvious. Be careful of self-diagnosis, especially if you or one of your workers already has a discomfort or injury that may be related to the work environment.

"It's not a good idea to do this as a self-help project," says Hall Smith, "and there are a lot of self-made experts who don't really know what they are doing." The interplay of people and their work environment is complex and bad advice can cause problems.

A good introductory book on ergonomics is *Fitting the Man to the Task*, by Etienne Gradjean. •

(Source: Adapted from "Crossroads," Spring 1994, Wisconsin T^2 Center.)

Safety Tips for Welders



Welding yields many important products, but it presents special hazards. Welding sparks have been known to travel as far as 35 feet, and welding spatter (hot metal) can burn right through clothing. That is why welders have to pay strict attention to safety.

Protective Equipment Is Essential

Eye and face protection are as important to welders as the tools they use, because welders are at risk for burns, heat radiation, and flying bits of hot metal. Protective equipment can reduce these risks substantially.

OSHA requires gas welders to wear impact- and heat-resistant goggles. Nonflammable welding helmets are recommended for many operations. Arc welders must wear helmets and goggles that resist heat, fire, impact, and electricity.

Some welding jobs call for a respirator to protect against the inhalation of fumes and gases. It must be properly fit-tested and the welder trained in its use.

Choose Clothing Carefully

When welding, wear clothing that will protect against burns from hot sparks or metal. Very hot work calls for a leather apron, leggings, and sleeves. Street clothes are acceptable for some jobs if you wear a long-sleeved shirt.

Keep your collar and cuffs buttoned and avoid clothes with pockets or cuffs that could catch sparks. Wear high-top work shoes with pant legs over them to keep sparks out. Keep clothes clean, since grease or oil spots can catch fire. If you are an arc welder, wear dry welder's gloves to protect your hands against electric shock. Use only nonflammable hair products.

Fire Is the Greatest Hazard

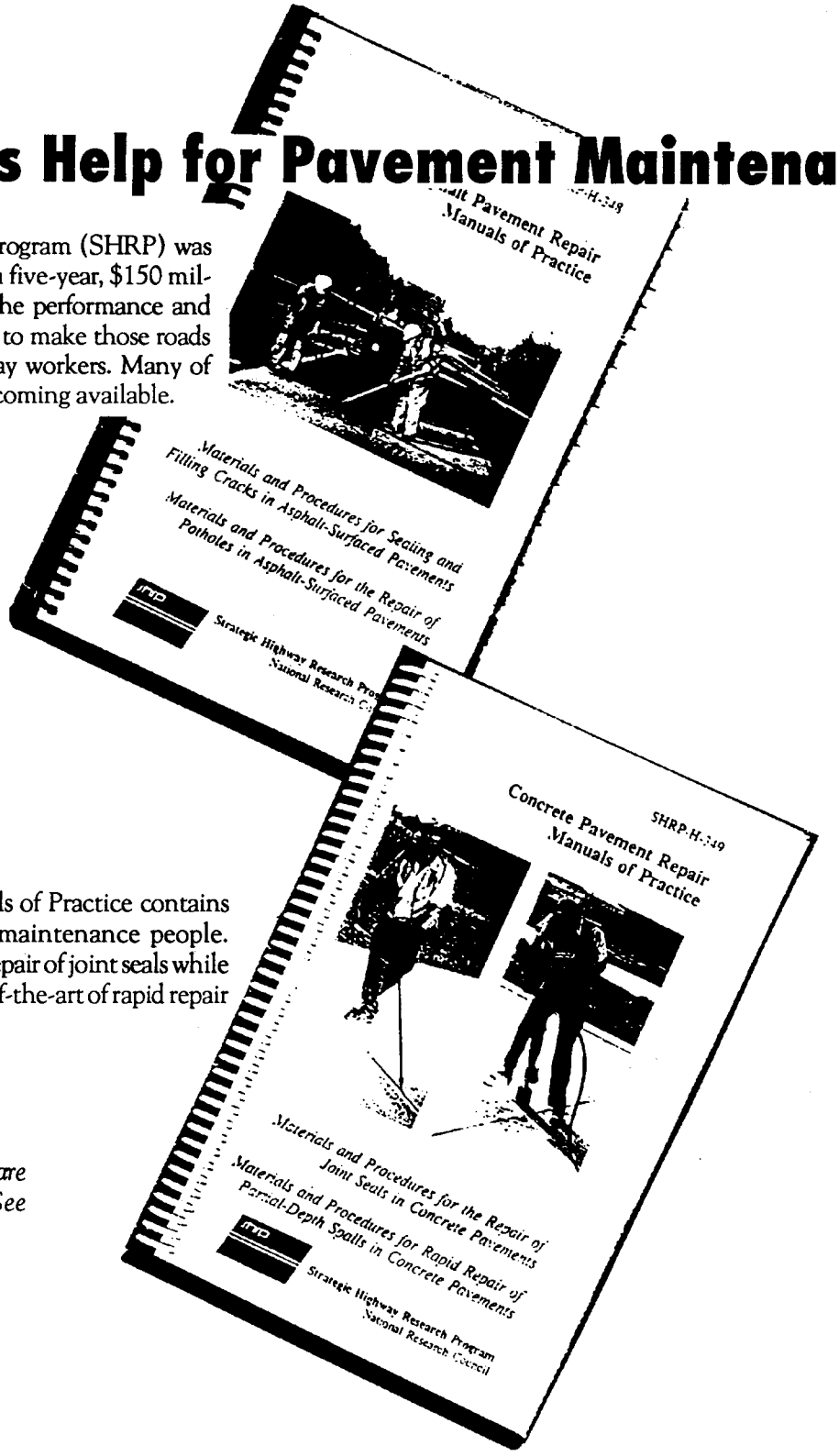
For any kind of welding, use these precautions:

- Obtain a "hotwork" permit if your company requires one.
- Remove flammables from your work area before starting the job.
- Use a combustible-gas indicator to see if flammable gases are present in the area.
- Try to restrict your welding operations to a separate room with a fire-resistant floor. If you must work in a room with a wood floor, wet it down or cover it with a fire-resistant shield.
- Cover flammables you cannot remove with a fireproof blanket.
- Close or cover any ducts that could transport sparks.
- Keep your work area free of trash.
- Keep fire extinguishers handy. Check them often to be sure they are working.
- Assign someone to be a firewatcher.

- ✓ **Be sure cylinders are properly labeled.**
- ✓ **Check equipment and hoses regularly for leaks.**
- ✓ **Do not use a leaking cylinder.**
- ✓ **Open valves slowly. Keep valves closed when cylinders are not in use or are empty.**
- ✓ **Turn off gas when you leave your work area.**
- ✓ **Transport cylinders by strapping them to carts. Do not let them fall or bang into each other.**
- ✓ **Never roll or drop a cylinder.**
- ✓ **Use and store cylinders only in areas with good ventilation.**
- ✓ **Light flames promptly or the gas could build up and explode when you light it.**
- ✓ **Store cylinders away from heat on a level, fireproof floor in a dry, ventilated area.**
- ✓ **Store incompatible gases separately. Oxygen, for example, should not be stored with flammable gases.**
- ✓ **Always keep cylinders upright.**
- ✓ **Keep cylinders away from sparks and spatter.**
- ✓ **Take care not to run over gas hoses.**
- ✓ **Do not use oxygen to blow away dust or to clean your work.**
- ✓ **Never use grease or oil to lubricate a gas cylinder.**
- ✓ **No smoking, please!**

SHRP Provides Help for Pavement Maintenance

The Strategic Highway Research Program (SHRP) was established by Congress in 1987 as a five-year, $150 million research program to improve the performance and durability of our nation's roads, and to make those roads safer for both motorists and highway workers. Many of SHRP's reports and products are becoming available.



Asphalt Pavement Repair Manuals of Practice contains two pavement maintenance manuals for use by highway maintenance agencies in the field and office. Each is a compendium of good practices for asphalt concrete (AC) crack sealing and filling and pothole repair.

Concrete Pavement Repair Manuals of Practice contains two manuals for use of highway maintenance people. Covered in the first manual are the repair of joint seals while the second manual shows the state-of-the-art of rapid repair of partial depth spalls.

A limited number of these publications are available through the T² Center. *See page 15 for ordering information.*

Why Can't We Use Speed Bumps on Our Block?

The speed bump is an increased hazard to the unwary driver ... a challenge to the dare-devil ... a disruption of the movement of emergency vehicles ... and the cause of an undesirable increase in noise.

Courts have held public agencies liable for personal injuries resulting from faulty design. Because speed bumps have considerable potential for liability suits, many officials have rejected them as a standard traffic control device on public streets. In addition, tests of various experimental designs have demonstrated the physical inability of a speed bump to successfully control all types of vehicles.

If a decision is made to use this method of speed control, a speed "hump" might be more acceptable. A hump, sometimes called a "sleeping policeman," is similar in design to a speed bump, but is not as sudden or as sharp. Speed humps are gently rounded, 3- to 4-inch protuberances that are at least 12 feet wide at the base.

The control of speed in residential neighborhoods is a legitimate concern and requires persistent law enforcement efforts. •

(Source: Excerpted from Kentucky Transportation Center, "The Link," Vol. 9, No. 1, Spring 1993.)

Quote by Nicholas Murray Butler

"People can be divided into three groups: those who make things happen, those who watch things happen, and those who wonder what happened."

In the News

Front-Line Road Troops Honored

At the recent meeting of the statewide county road supervisors, an equipment operation roadeo provided competition for the county's front-line workers. Winners of the Eighth Annual Equipment Roadeo were:

Grader Operation (15 competitors)

1st Place **Kyle Riddel** of Douglas County

2nd Place **Brad Harn** of Chelan County

3rd Place **Phil Meyer** of Whitman county

Single-Axle Truck Operation (15 teams of 2 persons each)

1st Place **Dan Love** and **Mike Nielson** of Chelan County

2nd Place **Ken Schwanz** and **Ken Price** and Clark County

3rd Place **Dennis Dilley** and **Al Tinkham** of Yakima County

Tandem Axle Truck Operation (15 teams of 2 persons each)

1st Place **Ken Schwanz** and **Ken Price** of Clark County

2nd Place **Mark Johnson** and **Scott Reiman** of Douglas County

3rd Place **Dan Love** and **Mike Nielson** of Chelan County

Loader Operation (15 competitors)

1st Place **Tim Arnold** of San Juan County

2nd Place **Don Thompson** of Pierce County

3rd Place **Shawn Romine** of Lincoln County

Traveling Trophy went to Chelan County with the greatest composite point score of the four events.

Clark County received the 1994 Sportsmanship Award. •

Bicycle and Walking Study Released

A recent FHWA report, requested by Congress, outlines current trends and recommends future policies to encourage bicycling and walking as alternate modes of transportation.

Two goals of the study are (1) doubling the use of bicycling and walking from 7.9 percent to 15.8 percent; and (2) reduce the number of injuries and fatalities to bicyclists and pedestrians by 10 percent. In addition to the various recommendations on the federal level, states and local agencies are encouraged to:

1. Organize a bicycling/pedestrian program.
2. Plan and construct facilities.
3. Promote bicycling and walking.
4. Educate bicyclists, pedestrians, and the public.
5. Enforce the laws and regulations. •

Forest Highway Program Revised

The Federal Highway Administration has issued a final rule that revises the Forest Highway (FH) Program regulations to, among other things, combine the FH category with the public lands highway category. The effective date of the final rule is July 13, 1994. •

(Source: AASHTO Regulatory Monitor, June 15, 1994.)

In the News (Continued)

Rail Crossing Elimination Proposed

In June, the Clinton Administration proposed legislation to help eliminate rail and highway grade crossings, including 100 percent federal funding, plus a bonus to local governments who participate.

The Rail-Highway Grade Crossing Safety Act of 1994 was unveiled at a press conference by Secretary Federico Peña on Monday attended by House and Senate members. Peña outlined the $15 million, 55-point initiative, which would include a bonus of $7,500 to local governments for each dangerous rail crossing that is closed, to be matched by a $7,500 grant from the railroad owning the crossing.

Funding for the program would be drawn from a setaside of $15 million out of the Surface Transportation Program funds of the ISTEA. •

(Source: AASHTO Journal, June 17, 1994.)

Crumb Rubber Newsletter Available

The Technology Transfer Center of the University of Nevada, Reno, has made available the "Crumb Rubber Modifier Technology News Brief," a newsletter which outlines current technical, managerial and legislative issues concerning crumb rubber.

The newsletter is prepared under contract with the National Cooperative Research Program, Project 20-7, to disseminate information on crumb rubber modifier (CM) technology to AASHTO states. Among the topics discussed in the newsletter are the application, testing, and performance of different CM processes utilizing SHRP procedures.

The newsletter will be issued as pertinent information becomes available. To receive copies of the newsletter, contact CM Project; University of Nevada; Technology Transfer Center; College of Engineering/257; University of Nevada, Reno; Reno, Nevada 89557; telephone (702) 784-1433; Fax (702) 784-1429. •

(Source: AASHTO Journal, June 17, 1994.)

"A Guide to Federal Environmental Requirements for Small Governments" Has Been Published by EPA

Aimed at communities with populations under 10,000, this publication maps out the federal environmental requirements in the functional areas of drinking water, wastewater, wetlands, solid and hazardous wastes, underground storage tanks, toxins, and clean air. The publication also provides, by state, a list of the appropriate environmental contacts at the state level and in the EPA region. A limited number of copies are available though the Government Printing Office. The guide costs $7.50 and it's stock number is 055-000-00459-5. GPO's phone number is (202) 783-3823. •

(Source: APWA Reporter — December 1993/January 1994.)

Skills Enhancement Opportunities

The purpose of this column is to inform you of the numerous educational opportunities that exist for Washington State and adjacent states' transportation people.

Northwest Technology Transfer Center
(206) 705-7386

- ❒ Techniques of Pavement Rehabilitation. September 13-16, Seattle/ Olympia area.
- ❒ Highway Safety Engineering Studies. October 17-19, Lacey.

Pacific Lutheran University School of Business Center for Executive Development
(206) 535-7330, Fax (206) 535-7333

- ❒ Horizontal Management. August 8-9, Seattle.
- ❒ Supervisory Survival Skills. October 18-19, Tacoma.

American Management Association
1-800-255-4141 or (913) 451-2900

- ❒ The Complete Guide to Activity Based Training for Adults. August 9-10, Portland; August 2, Seattle. $395.
- ❒ How to Write, Design, and Edit Newsletter. August 15, Seattle. $265 regular/$240 nonprofit or two or more people.
- ❒ The Basics of Taking Physical Inventories and Cycle Counts. September 14, Boise; September 19, Portland; September 20, Seattle; September 22, Spokane. $145.
- ❒ The Basics of Employee Management and Supervision. September 14-15, Seattle. $295.
- ❒ How to Be a Better Team Leader. September 19, Seattle; September 20, Portland. $99.
- ❒ The Basics of Windows. September 23, Boise; September 26, Spokane; September 27, Seattle; September 29, Portland. $145

American Public Works Association (APWA)
(206) 543-5539, Fax (206) 543-2352

- ❒ International Symposium: Public Works and the Human Environment. April 19-21, 1995, in Seattle.

Professional Engineering Practice Liaison Program (PEPL) University of Washington, College of Engineering
(206) 543-5539

- ❒ Groundwater Modeling Using MODFLOW and MODPATH Software: New Interface for Practical Applications. September 8-9.
- ❒ Effective Writing for Technical Professionals. September 8.
- ❒ Stormwater Drainage Facility Inspection and Maintenance Training Program. September 14 or 19. (Note: This is a four-day short course to be given either September 14, 15, 21, and 22 or September 19-22.)
- ❒ Limiting Engineer/Architect Professional Liability Exposure. September 16.
- ❒ Applied Surface Water Pollution Prevention Planning (SWPPP) Techniques. October 5.
- ❒ Mastering the Land Development Process: Making the Most of Difficult Times. October 13. First in a trilogy of seminars on land usability.
- ❒ Seismic Design of Structures I: Dynamic Analysis and Lateral Load Determination. October 18, 20, 25, 27; November 1, 3, 8, 15, 17, and 22.
- ❒ Successful Negotiation Skills in Construction Projects: The Key to Obtaining the Best Results and Avoiding Disputes. October 19.
- ❒ Recent Developments in Construction Site Safety: Impacts on Owners, Contractors, Construction Managers, and Design Professionals. October 28.
- ❒ Land Use and Environmental Regulatory Maze: How to Make it Work for You. November 3. Second in a trilogy of seminars on land usability.

TRANSPEED (Transportation Partnership in Engineering Education Development)
(206) 543-5539

- ❒ Roadway Geometric Design Standards. August 15-17, Seattle.
- ❒ Basic Roadway Pavement Design. August 25-26, 1994, Seattle.
- ❒ Basics of Traffic Engineering. August 29-30, Seattle.
- ❒ Basic Highway Capacity Analysis for Engineers and Planners. September 7-9, Seattle.
- ❒ Design and Evaluation of Roadside Safety Features. September 26,Yakima; September 27, Seattle.

- ❒ **Advanced Highway Capacity Analysis for Engineers and Planners.** September 21-23, Seattle.
- ❒ **Legal Liability: Design, Construction, Traffic Operations, and Maintenance.** October 4-5, Seattle.
- ❒ **Roadway Value Engineering.** October 12-14, Spokane.
- ❒ **Hydrology and Basic Roadway Drainage Design.** October 17-19, Lacey.
- ❒ **Introduction to Pavement Management.** October 25-26, Seattle.
- ❒ **Effective Implementation of Pavement Management Systems.** November 3-4, Seattle.
- ❒ **Stormwater Engineering for Transportation Engineers.** November 8-10, Seattle.
- ❒ **Construction Inspection of Public Works Projects.** December 1-2, Seattle.
- ❒ **Pubic Works Construction Project Management.** December 5-6, Seattle.

Measurement Research Corporation (MRC)
(206) 851-3200, Fax (206) 851-4334

- ❒ **Getting Started in PMS.** September 13. $125.
- ❒ **PMS Budget Analysis.** September 14. $125.
- ❒ **Project Level Analysis.** September 15. $125.
- ❒ **NDT and Pavement Design.** November 15-16. $125.

Department of Labor and Industries Consultation and Education Program
(206) 956-5451

The following is a listing of some of the free L&I scheduled classes.

- ❒ Accident Investigation
- ❒ Accident Prevention Programs
- ❒ Bloodborne Pathogens
- ❒ Controlling Your Claims Costs
- ❒ Excavation and Trenching
- ❒ Fall Protection
- ❒ Hazard Communication
- ❒ Hazardous Waste Operations and Emergency Response
- ❒ Lockout/Tagout
- ❒ Making Cents of Your Premium Dollars
- ❒ RETRO — Optional Financial Incentives
- ❒ Return-to-Work Programs Make Sense
- ❒ Supervisor's Guide to Loss Control
- ❒ Take Control of Worker's Compensation
- ❒ Worker's Comp: Who and How to Report
- ❒ Ergonomics for Employers
- ❒ Injury and Illness Recordkeeping
- ❒ Job Analysis
- ❒ New Employer Orientation
- ❒ Office Ergonomics

Keye Productivity Center
1-800-821-3919

- ❒ **Basic Supervision.** August 4, Portland; August 10, Spokane; August 11, Seattle. $139.
- ❒ **How to Interview People.** August 18, Seattle; August 17, Portland. $139.
- ❒ **OSHA Compliance: The Two-Day Certification Workshop.** August 22-23, Portland; August 24-25, Seattle. $395.
- ❒ **How to Be a Better Trainer.** September 1, Portland; September 2, Seattle. $139.

National Business Women's Leadership Association
1-800-258-7246

- ❒ **How to Manage Conflict and Maintain Emotional Control for Women.** August 5, Portland; August 4, Yakima; August 19, Vancouver; August 22, Wenatchee; August 24, Everett; August 25, Tacoma; August 3, Seattle; August 23, Seattle; August 26, Olympia.

Conferences and Meetings

- ❒ **NACO Annual Conference.** July 31-August 4, Las Vegas, NV.
- ❒ **FHWA Region 10 Planning and Environmental Conference.** August 1994, Portland. Contact Chuck Chappell (206) 753-2119.
- ❒ **Washington City/County Management Association (WCMA).** August 16-20, Spokane.
- ❒ **Creating Solutions Together — 13th Annual National Minority and Women Business Enterprises, Equal Employment Opportunity and Contract Compliance Conference.** Hosted by the Washington State Department of Transportation. August 28-31. Seattle Sheraton Hotel & Towers, Seattle. Early registration fee $250. For further information and registration call: (206) 684-7608, TDD (206) 233-1088, Fax (206) 684-8571.
- ❒ **CEAW.** September 13, Pasco.
- ❒ **APWA.** September 13-16, Pasco.
- ❒ **Washington City Planning Directions Association (WCPDA).** September 13-16, Chelan.
- ❒ **Northwest Concrete Pavement Short Courses and Seminar.** October 11-14, Red Lion Columbia River Hotel, Portland, OR. Contact Jean Canfield, Conference Manager; P.O. Box 135, Olympia, WA 98507-0135, (206) 943-7732.
- ❒ **1994 Idaho Asphalt Conference.** October 27, Moscow, ID. $45.

Selected References

All of the following can be obtained directly from the source given.

Highway Drainage Guidelines — Vol. XI, AASHTO Guidelines for Highways Along Coastal Zones and Lakeshores

AASHTO has announced the availability of this new publication concerning highway construction along shorelines.

The guide provides information on shoreline typography, wave and current characteristics, highway design considerations, shore protection devices, planning for shoreline changes, and hydraulic-related construction and maintenance considerations.

Copies of the 52-page book are available from AASHTO at a cost of $16 for members and $19 for nonmembers, which includes postage and handling. Please specify code HDG-2(V)11. •

Logistics for Hazardous Materials Transportation: Scheduling, Routing, and Siting-1990

This 182-page report describes the development of decision support systems to help public and private sector decision makers improve the management of hazardous materials logistics. The areas of principal concern are the routing of hazardous material and waste shipments, the scheduling of these shipments, and the siting of the facilities that process or treat the wastes.

Single copies of this report are available to support state and local officials at no charge. To receive a copy, send a self-addressed mailing label with your request to the Technology Sharing Program; U.S. Department of Transportation; 400 Seventh Street S.W. (M-443.2); Washington, D.C. 20590. Please note the report's title and document number, DOT-T-92-09, in your request. •

Human Factors Design Handbook

Wesley E. Woodson, Barry Tillman, and Peggy Tillman; 846 pages; $96.50; McGraw-Hill Book Company, 11 West 19th Street, New York, NY 10011, 1-800-2-MCGRAW.

Every time somebody bangs a knee, bumps a head, or cannot reach something easily, "human factors" were probably not considered in the design. Subtitled, *Information and Guidelines for the Design of Systems, Facilities, Equipment, and Products for Human Use*, this volume presents a tremendous amount of data and practical guidance. The goal is to help design "for the user" rather than making the user adapt to the design. •

Civil Engineering for the Community

Dennis Randolph; 86 pages; $20 nonmembers, $15 members, book code 845; American Society of Civil Engineers, Book Orders, P.O. Box 831, Somerset, NJ 08875; 1-800-548-ASCE.

This practical guide presents information on the "other side of engineering," the interpersonal and communications skills required of engineers working in the public arena. It is a nontechnical look at public administration, management, working with citizens and elected officials. •

Directory of Operating Grants

Richard M. Eckstein; 144 pages; $46.50; Research Grant Guides, Dept. 3A, P.O. Box 1214, Loxahatchee, FL 33470; (407) 795-6129. Several articles and a list of 640 foundations that provide community grants, listed state-by-state. •

Community Recycling: System Design to Management

Nyles V. Reinfeld et al.; 225 pages; $50; Prentice Hall, Englewood Cliffs, NJ 07632; telephone 1-800-223-1360. A practical guide with do's and don'ts, myths, and reality, different systems, economics, management, and other useful information on recycling. •

Concrete Repair Basics (1992)

An assembly of ACI committee reports and articles from Concrete International (CI) magazines to present some recommendations on repairing concrete. Committee reports represent a consensus of the leading authorities on the topic. Chapters include: conditions survey and repair strategy, repair materials, preparation for repair techniques for bridges and pavements, repair techniques on civil engineering structures, repair techniques for buildings and parking structures, and protection of structures. This book is intended as an easy reference document. 1992, soft cover, 375 pages, order code: SCM 24-91,D054, $62.95, ACI members $52.50. Contact ACI at (313) 532-2600. •

Concrete Repair and Maintenance Illustrated (1993)

From parking garages to roads and bridges, to structural concrete, this book describes the causes, effects and remedies for concrete wear and failure. Also covered is the difficult task of estimating repair and renovation of concrete structures. This book includes presentation of over 220 concrete repair and maintenance topics. Detailed illustrations guide in the proper planning and execution of repairs. Published by R. S. Means Company, Inc., and written by one of the foremost authorities on concrete repair, Peter H. Emmons. 1993, hard cover, 295 pages, order code: CRMI.D054, $64.95. Contact ACI. •

Free Publications

For Washington recipients only: Contact Laurel Gray at (206) 705-7386 if you want publications.

Rating Unsurfaced Roads — A Field Manual for Measuring Maintenance Problems, CRREL

(Special Report 87-15) This brief report provides the tools necessary to rate and evaluate the unpaved roads of an agency. Prepared by the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL). September 1988.

Unsurfaced Road Maintenance Management, CRREL

(Special Report 92-26) After ratings are made of unsurfaced roads, the next steps are covered in this special report by CRREL. A systematic and organized process is presented on managing the maintenance of these unsurfaced roads. December 1992.

Highway Utility Guide (FHWA-SA-93-049)

The guide "provides the state-of-the-knowledge on the better practices being employed. It addresses the full array of issues which can arise from highway and utility facilities sharing a common right of way." June 1993.

Asphalt Pavement Repair Manuals of Practice (SHRP-H-348)

See page 9 for description.

Concrete Pavement Repair Manuals of Practice (SHRP-H-349)

See page 9 for description.

Guidelines for a Good Chip Seal Job

A two-page brief summary of the basic considerations for chip seal work. Adapted by NWT^2 Center from Oklahoma T^2 materials.

Working With Pesticides

A brief five-page paper providing ten tips on cleaning pesticide soiled clothing, symptoms of pesticide poisoning, and sprayer operation do's and don'ts.

Traffic Control Devices et al. and Tort Liability

A series of articles from various T^2 Centers on risk management and liability cases and issues. Seven pages.

Operating Tips — Flagging

This poster style paper provides a "quick how-to" for flagging. A handy reference and reminder for your flaggers. Prepared by the NWT^2 Center.

Local Low Volume Roads and Streets Manual

This well organized manual provides local agencies with basic information on planning, design, construction, and maintenance of local low volume roads and streets. It is easy to use and specific topics may be quickly located. The publication was made possible by the joint efforts of ASCE, FHWA, and the USDA Forest Service and is dated November 1992.

The Forgiving Highway

A brief 10-page booklet by FHWA emphasizing the forgiving highway concept.

Geotextile Selection and Installation Manual for Rural Unpaved Roads (FHWA-RT-89-050)

This report serves as a guide for local officials in selecting and installing geotextiles and presents various techniques to address conditions and situations on rural unpaved roads.

Moving With Metric — Metricube (FHWA-SA-94-018)

This foldable cube shows volume, temperature, mass weight, length, and other interesting facts on metric conversion.

A newsletter of the Local Technical Assistance Program (LTAP)

Issue Number 43, Summer 1994

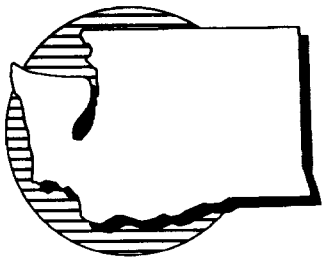
Bulletin

The Technology Transfer Center (T^2) Program is a nationwide effort financed jointly by the Federal Highway Administration (FHWA) and individual state departments of transportation. Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation to local highway and transportation personnel.

Any opinions, findings, conclusions, or recommendations presented in this newsletter are those of the authors and do not necessarily reflect the views of WSDOT or FHWA. All references to proprietary items in this publication are not endorsements of any company or product.

Washington State Department of Transportation
TransAid

U. S. Department of Transportation
Federal Highway Administration



Northwest Technology Transfer Center
WSDOT-TransAid
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